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ABSTRACT

Literacy should be viewed as the ability to enlist a repertoire of discourse forms to explore and extend thinking and learning. In this view of literacy and literacy learning, various forms of reading and writing are seen as distinct ways of knowing and acquiring knowledge for ones' own purposes. Supporting this view of literacy are theoretical and research findings from various sources, including research in reading and writing, knowledge acquisition, and current functional approaches to literacy. However, while studies have examined the influence of a restricted array of teacher-initiated reading and writing tasks on content learning, researchers need to investigate in-process thinking and learning by individuals involved in the self-directed use of reading and writing activities. In terms of instruction, the development of literacy repertoires is a major goal as students study difficult topics and attempt to solve complex problems. Helping students acquire a "critical literacy"--the ability to use reading and writing for purposes which exceed those most often associated with minimum competence--is of utmost importance, and may warrant a reconceptualization of literacy learning that would entail a critical analysis of current principles and practices dominating how reading and writing are used and taught across the grades. (Fifty-four references are appended.) (MM)

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CENTER FOR THE STUDY OF READING

A READING RESEARCH AND EDUCATION CENTER REPORT

Technical Report No. 423

READING AND WRITING AS WAYS OF KNOWING AND LEARNING

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Abstract

This paper proposes a view of literacy and literacy learning in which various forms of reading and writing are reconceptualized as distinct ways of exploring a knowledge domain enroute to acquiring new knowledge. We begin by reviewing current notions regarding the relationship between cognitive processes in reading and writing. Second, we examine the theoretical basis for writing as thinking before moving on to explore a select group of studies which address the influence of writing upon learning. Third, we present our own views on literacy as they relate to recent theories of knowledge acquisition in complex content domains and some of the more current approaches to critical literacy.

READING AND WRITING AS WAYS OF KNOWING AND LEARNING

The relationship of writing to thinking and learning has become a topic of increasing interest among both teachers and researchers. Underlying this interest, particularly in content area subjects, is the belief that writing actually engenders understanding by virtue of the exploration and reexamination of ideas that it affords. Recent instructional reforms have advocated the improvement of writing instruction as a means to improve the thinking and reasoning ability of students in academic subjects. These reforms, often referred to as "writing across the curriculum," originate with the belief that the kind of writing students do in school has a direct influence on the quality of thinking in which they are required to engage (Fulweiler & Young, 1982; Langer & Applebee, 1986; Martin, 1975; & Mayher, Lester, & Pradl, 1983).

In examining the effects of writing on learning from text, researchers have employed a variety of experimental approaches which control the kind of writing students are allowed to engage in, as well as the process by which students are permitted to use reading and writing in order to learn. Several investigators have characterized the different types of thinking and learning that result from specific kinds of writing (e.g., notetaking, summarizing, study guide questions, and extended writing). In most cases, this has entailed an examination of students while they perform one of several prescribed writing activities (Langer & Applebee, 1986).

Despite the view that students should use writing in ways that will foster learning and personal interpretation of content area material, these studies continue to foster a model of literacy instruction in which the use of writing as a means to learn has remained the province of the teacher--an activity assigned by the teacher and completed by the student. Consequently, students are unable to understand how writing and reading can function as rhetorical acts capable of being used for their own purposes. In support of this alternate view, Freeman and Sanders (1987) contentd that students' awareness of the functions of writing will encourage them to engage in self-initiated acts of writing which serve their own needs.

Drawing upon recent theories of knowledge acquisition and selected studies of the role of writing in learning, we wish to propose a view of literacy and literacy learning in which various forms of reading and writing are reconceptualized as distinct ways of knowing and acquiring knowledge for ones' own purposes. In addition, this paper seeks to establish the importance of helping students acquire what Katz (1982) refers to as "critical literacy" or the ability to use reading and writing for purposes which exceed those most often associated with minimum competency. If we approach literacy from this perspective, the extent to which an individual is considered to be critically literate is understood in terms of their growing facility to enlist or make meaningful use of those skills which comprise their literacy repertoire.

Finally, we wish to argue that this theoretical orientation toward literacy warrants the exploration of students' ***self-directed engagements*** in various ***combinations*** of reading and writing activities enroute to accomplishing certain language related goals. We intend to argue that only by examining student's own strategic use of various forms of reading and writing, can we begin to understand how these modes influence thinking and learning.

In making our position clear, we begin by reviewing current notions regarding the relationship between cognitive processes in reading and writing. Second, we examine the theoretical basis for writing as thinking before moving on to explore a select group of studies which address the influence of writing upon learning. Third, we present our own views on literacy as they relate to recent theories of knowledge acquisition and more current approaches to functional literacy. We conclude by discussing the research and instructional changes warranted by such theories.

Composing and Comprehending: Some Background

Cognitive Processes in Reading and Writing. Perhaps one of the most influential developments in language research of the 1980's is the view that both readers and writers are engaged in the act of building or constructing a "textual-world" during the process of making meaning (Kucer, 1985; Langer, 1986a; 1986b). Beyond establishing some "common ground" between the acts of composing and comprehending, the metaphor of text-world production is also of empirical and pedagogical importance in that it reinforces the active, productive nature of both reading and writing.

Readers, formerly understood to be involved in a receptive text-based process of abstracting the author's meaning from the text, have recently been described as performing cognitive activities analogous to evolving a schema (Anderson & Pearson, 1984); building and revising a model of the text (Collins, Larkin, & Brown, 1980); developing envisionments or momentary understandings of a text (Langer, 1986a; 1986b); generating relations between the text and one's experience (Linden & Wittrock, 1981; Wittrock, 1984); testing and evaluating hypotheses for "goodness of fit" to aspects of a given test (Rumelhart, 1984); enriching, elaborating, and assembling meaning based on context-relevant prior knowledge (Spiro, 1980).

Phenomenological theories of the reading process reflect a somewhat similar position. For example, Barthes (1974) argues that the value in embracing a more "writerly" view of text as opposed to a "readerly" view is that it holds the reader to be a "producer" rather than a "consumer" of text (p. 4). Rosenblatt (1978) explains the reader's creation of meaning from a text as an "active, self-ordering and self-correcting process" characterized by subtle adjustments and refinements of meaning in an effort to achieve a coherent interpretation. Similarily, Iser (1978) suggests that "reading is not simply a text-based activity, but an interactive (transactive) process in which reader and the text both contribute to the meaning that evolves" (p. 588).

A current approach to understanding the comprehension processes is in terms of their connection to the composing processes. This approach is evident in the recent work of several reading and writing researchers. For example, Tierney and Pearson (1984) compare reading and writing on the basis of their shared "composing" properties. While contending that few would disagree that writers compose meaning, they propose a view of reading in which readers also "compose the meaning of a text in front of them" (p. 34).

Tierney and Pearson argue that good reading involves several processes that are also characteristics of good writing. According to their view, proficient readers often plan or set goals prior to reading, draft or compose an initial understanding of the meaning they are making, align or adopt perspectives related to the meanings being composed, revise or refine the meaning that they are developing, and monitor or evaluate the plausibility of the interpretation that they are constructing.

Through a realted constructivist "lens," Kucer (1985) proposes a theory of "text-world production" in delineating the "cognitive universals" common to reading and writing (p. 319). According to this view, Kucer explains that understanding the relationship between reading and writing lies in recognizing each act as an essentially separate instance of text-world production "drawing from a common pool of cognitive and linguistic operations" (p. 319).

Similarily, other researchers have conceptualized the relationship between comprehension and composition by way of the power of both reading and writing to restructure one's consciousness or "inner speech" (Moffett, 1984); the process oriented thinking skills that each one requires (Squire, 1984); the generative cognitive processes involved in building relations between the text and what we know (Wittrock, 1984); and the similar kinds of knowledge that both readers and writers use (Rubin & Hansen, 1984).

Expanding on this view, Langer (1986b) argues that in our enthusiasm to explore the commonalities between composing and comprehending as a rationale for combining them instructionally and theoretically, we have neglected to examine what effect their differences might have upon learning. Concerning this issue she writes:

> It is an understanding of the differences as well as the similarities (and the linguistic and cognitive behaviors they invoke) that will lead to a more complete understanding of literacy learning, and of effective instruction. (Langer, 1986b, p. 1)

In a descriptive study examining the reading and writing behaviors of 67 children ranging in ages from 8 to 14, Langer found that both reading and writing are similar purpose-driven, meaning-based activities. However, she also discovered that because they serve different purposes in children's lives and children engage in them in different ways, "reading and writing generate different patterns of cognitive behaviors and rely on different patterns of knowledge at different points in time--before, during, and after the activity" (p. 8).

For example, in examining student's think-aloud protocols as they read and wrote, Langer found that children's self-report comments reflected more use of schemata, more concern with citing evidence in support of interpretations and with validating previous interpretations as they read. On the other hand, children's protocols reflected greater attention to making hypotheses and metacomments while they wrote.

In short, efforts to understand the conceptual processes underlying reading by drawing parallels to the processes underlying writing, have had the effect of facilitating the conceptualization and acceptance of reading as an active, meaning-based activity. Unfortunately, this relationship has been somewhat less than reciprocal since writing has only recently been recognized for its potential to sponsor learning. Indeed, writing performed in the context of reading often becomes no more than a vehicle for the transmission of ideas. As Gage (1986) explains, the tendency to teach writing as strictly a "technical skill" as opposed to an "intellectual process" has led some students to view composing as separated from thinking and learning. "They think of it as something that can be done *in addition to* learning, but not as directly related to what they know or how well they think" (p. 18). It is to a further discussion of the role of writing in thinking and learning that we now turn.

The Theoretical Basis for Writing as a Way of Thinking and Knowing

The notion that the act of writing engenders new knowledge has been a topic of interest and discussion for psychologists for a number of years. For example, in exploring writing as heuristic, Luria and Yudovich (1971) explains that writing "represents a new and powerful instrument of thought" by virtue of its "slower, repeated mediating process of analysis and synthesis" as well as its "self-reviewing structure" (p. 118). Britton (1970) explains that writing affords the symbolic representation of experience, and in so doing has the effect of organizing experience and rendering it more memorable. Vygotsky (1962) argues that writing requires more "deliberate analytical action" and an awareness of the process involved in constructing meaning (p. 99). As he states:

> The change from maximally compact inner speech to maximally detailed written speech requires what might be called deliberate semantics--deliberate structuring of the web of meaning. (p. 100)

In explaining that writing is a unique mode of learning, different from other language processes such as listening, reading, and talking, Emig (1977) delineates how writing, as a single act, encompasses many of the traits that psychologists have traditionally associated with learning strategies. For example, Emig contends that writing is a "uniquely powerful multi-representational mode for learning" because when we compose, we learn by doing, by witnessing what we have done, and by representing experience symbolically (p. 124).

Still other researchers have argued persuasively that writing can sponsor learning because it engages one in the process of "joining bits of information into relationships, many of which have never existed until the composer utters them" (Nostrand, 1979; p. 178). Martin (1975) expresses the view that the act of writing, which induces one to engage in a process of personal selection, contemplation, and differentiation, changes the writer; making him or her "a different person" for having "articulated a feeling, thought, or attitude more clearly" (p. 35). VanDeWeghe (1987) describes the composing process as the vehicle through which writers often create "heuristic moments" or moments of conceptual breakthrough or insight into a topic.

Recently, Gage (1986) described how writing contributes to knowing in his recent chapter "Why Write" in the NSSE yearbook on The Teaching of Writing. As he states:

> Writing is thinking made tangible, thinking that can be examined because it is on the page and not in the head invisibly floating around. Writing is thinking that can be stopped and tinkered with. It is a way of holding thought still long enough to examine its structures, its flaws. The road to clearer understanding of one's thoughts is travelled on paper. It is through an attempt to find words for ourselves in which to express related ideas that we often discover what we think. (Gage, 1986, p. 24)

Additional support for this view which envisions writing to be a tool for learning and thinking is present in the research investigating the conceptual processes of writers as they develop meaningful texts. In a study of the composing processes of five unskilled college writers, Perl (1979) utilized a think-aloud procedure in order to explore *how* students compose. By examining the nature of the talking, writing, and reading that students engaged in while they wrote, Perl witnessed the recursive nature of the students composing, and proposed the following hypothesis concerning the clarifying effect of having written:

> Composing always involves some measure of both construction and discovery. . . . Constructing simultaneously affords discovery. Writers know more fully what they mean only after having written it. In this way the explicit written form serves as a window on the implicit sense with which one began. (p. 331)

In exploring the planning procedures that writers use, Flower and Hayes (1981) contend that writing is a "complex problem-solving process" in which writers use a "repertory of powerful heuristics" such as "planning, brainstorming, or simulating a reader's response" as a means of generating new ideas (p. 40). In proposing a view of literacy in which both reading and writing are understood as ways of knowing we now turn to an examination of several specific studies which explored the effects of writing upon thinking and learning from text.

Studies of the Influence of Writing Upon Thinking and Knowing

The research on the influence of writing upon understanding both narrative and informational texts provides some support and definition as to how composing might be used to facilitate learning from texts. The intention here will be to examine these studies in hopes of understanding more clearly just how writing in the context of reading influences thinking and learning. In addition, particular attention will be devoted to an exploration of the methodologies employed in each study as they reflect the extent to which students are permitted to direct their own uses of different forms of reading and writing enroute to learning. Across the various studies which have examined extended writing (i.e., analytical, personal, and formal writing; Applebee, 1981) as a means of shaping thought the following findings emerge:

1. Extended writing in the context of reading enhances student's knowledge acquisition, skill development and thinking ability by extending and enriching their level of cognitive engagement both during and after reading.

2. Extended writing performed in this context (pre or post reading) induces a level of task engagement that has advantages over that induced by notetaking, study guide questions, predictions, supplementary reading, knowledge activation activities, and summarizing.

3. The combination of more extensive writing with reading as a means of knowing has a powerful effect upon cognitive engagement and learning that is not achieved when either reading or writing are undertaken as isolated modes of learning.

To appreciate the specific methodologies, ramifications, and limitations of this research, consider the following studies in which writing, as a means of shaping thought, is combined with reading in the areas of literature and the sciences.

Learning from literature. One set of studies has examined the effects of learning from reading when writing was used to precede reading. For example, McGinley and Denner (1987) report the effects of writing as a knowledge activation activity upon students' understanding of literature and their approach to exploring narratives in two separate experiments (Denner & McGinley, 1986). A series of "story-impressions" (i.e., brief clues about the content of the to-be-read story that were arranged in vertical order to represent the proper sequence of story events) were used as prompts for having students in the experimental group write their own stories. A control group simply studied a set of story-impressions and wrote a brief prediction of the story.

In both experiments, the researchers found that this type of writing (story-impressions) done prior to reading prompted more engagement with the story, and therefore enhanced understandings of the narrative. More specifically, the act of writing a story based on a series of story-impressions changed the way in which poorer readers approached reading by involving them in the cognitive operations of generating, confirming, and disconfirming hypotheses concerning the story content.

The effect that writing about literature has upon thinking and learning is also evident in the work of Marshall (1987). Marshall examined the effects of using various writing experiences in conjunction with doing an instructional unit on J. D. Salinger with three classes of 11th-grade students. During the unit, students read Salinger's short stories with no teacher-sponsored discussion and wrote in each of three modes: (a) restricted writing--students were to respond to eight short answer questions concerning aspects of each story; (b) personal writing--students were to explain and elaborate upon their individual responses to the story, drawing on their own values and previous experience; and (c) formal writing--students were to interpret the story in extended fashion, drawing inferences mainly from the text alone. Six case study students completed the same task while composing aloud. Results support the view that writing is a means of shaping thinking, and as such, when students engage in extended writing (personal or formal) in the context of reading, they had a substantial advantage over students engaged in restricted writing in terms of what they learned about Salinger's work, his craft, and how they approached the text.

For example, when students wrote extensively after reading, they performed better on a posttest designed to measure three levels of literary understanding: description, interpretation, and generalization. In addition, when students engaged in personal writing, they approached the stories from more diverse literary perspectives when compared to restricted writing as evidenced by the range of descriptive, personal, interpretative, and evaluative statements appearing in their writing. In examining the reasoning operations that students engaged in before and during different types of writing, Marshall found that extended writing induced students to engage in significantly more examination, interpretation, and deliberation of the stories.

Colvin-Murphy (1986) studied the effects of having 85 eleventh-grade students complete various post-reading activities in response to a series of poems. In the post-reading activities, small groups of students engaged in a self-directed discussion of each poem following their completion of one of the following: reading with extended writing, reading with worksheet activities, and reading alone. The extended writing activity was done in response to Bleich's (1975) heuristic: What did you see? What thoughts and associations come to mind? What other things does it lead you to think about? Based upon pre- and posttest measures and interview data, students engaged in writing remembered more of the poems' content, were more engaged in thinking about what they were reading, and were more sensitive to the author's craft. As in previous studies, writing in the context of reading prompted deeper cognitive involvement in the task.

From a more instructional orientation, Salvatori (1985) has made similar claims about the power of involving college students in writing and reading. Her research is based upon the notions of Gadamer (1986)--a hermeneutic whose central thesis is that to understand a text is to come to understand oneself in a kind of dialogue. For example, in an attempt to have students become aware of their own voice, early stages of instruction involve them in writing about and discussing a significant event in their lives.

By using a thoughtfully developed sequence of writing with reading and discussion activities, Salvatori demonstrates that the approach adopted by students for exploring personal experiences and reading assignments can change from one which is passive to one which is active and dialectic. More specifically, by carefully guiding students' writing, reading, and discussion activities around significant events in their life, she demonstrated that she was able to take students *from* mechanical responses, in which thinking and self-reflection either have no part or are unnecessarily complicating, *to* active engagements in critical inquiry involving self-reflection, dialogue, self-questioning, and discovery.

Learning in science and social science. In another set of studies, a growing number of researchers have examined the effect of writing upon learning in certain content domains such as chemistry, biology, history, and music.

In the area of history, Gould, Haas, and Marino (1982) demonstrated that students who wrote a letter about their view of life in a particular historical setting (Oregon in 1845 in this instance) before reading a related text, understood the text better than students who wrote on topics unrelated to the text. The authors explain that a "generative writing task," such as the one employed in their study, capitalized on the writing process to "build schemata for comprehension" (p. 3). In other words, the authors suggest that writing altered the outcome of having read by inducing students to make predictions, ask questions, and by creating in them an "investment in wanting to know" (p. 7). This study illustrates how the combination of writing with reading resulted in different thought processes and learning outcomes than if reading or writing had occurred alone.

Newell (1984) observed similar results in his investigation in two content areas. Over the course of 12 weeks, Newell rotated 8 eleventh-grade students through the use of notetaking, study-guide questions, and essays for different topics. Two major findings emerged from the study. First, students involved in essay writing, especially those who had limited knowledge of a topic, acquired more knowledge of key concepts than equivalent students who either took notes or responded to study-guide questions. Second, based on an analysis of students' think-aloud protocols when they were involved in essay writing, students engaged in a greater overall number of cognitive (reasoning) operations (i.e., planning, generating, organizing, goal setting, translating, and reviewing) in comparison to notetaking and answering study questions. Newell's comment concerning the effect of writing upon thinking about text helps clarify how writing in conjunction with reading influences learning. Newell argues that the production of coherent rather than fragmentary text involved more extensive thought and consideration of passage content than notetaking or study questions. As he states:

> Essay writing requires that the writers, in the course of examining evidence and marshalling ideas, integrate elements of the prose passage into their knowledge of the topic rather than leaving the information in isolated bits. (Newell, 1984, p. 282)

Copeland (1987) also investigated the influence of writing upon 120 sixth-grade student's ability to learn from informational texts. Students were randomly assigned to one of four post-reading treatment conditions: (a) a writing activity which required them to synthesize major concepts in the passage; (b) a multiple-choice question activity which reviewed major concepts; (c) a directed rereading activity which required students to synthesize major concepts without writing; and (d) a control group activity which required students to solve vocabulary puzzles unrelated to the topic of the passages.

Upon completing their respective activity, students first completed a transfer of learning task which required them to apply the knowledge they acquired from reading in order to interpret novel situations. Students then answered 10 multiple-choice questions designed to measure their memory of factual information. Results of the study indicated both good and poor writers who wrote compositions as part of their learning remembered substantially more factual information and were consistently more able to transfer and apply that information in understanding new situations. Copeland attributed the differences in student performance to the cognitive demands inherent in the extended writing activity. As she explained:

> Both the multiple-choice questions and the writing activities focused students' attention upon important ideas. However, in completing the writing activities, students were required to form relationships among ideas through the development of a unified response for someone other than themselves. (Copeland, 1987, p. 25)

A recent study undertaken by Tierney, Soter, O'Flahavan, and McGinley (1986) both complements and extends the findings of Gould, Haas, and Marino (1982), Newell (1984), and Copeland (1987). This investigation was unique in its attempt to examine the effect that various *combinations* of reading and writing have upon critical thinking. In particular, the study pursued the question of whether writing in combination with reading prompts more thinking or cognitive engagement than reading or writing done separately, or in combination with questions or knowledge activation. One hundred thirty-seven undergraduate students were randomly assigned to 1 of 12 conditions involving various combinations of the following: writing a letter to the editor about one of two issues; reading an editorial passage about the same issue; answering selected questions pertaining to the editorial; revising a first draft of the letter to the editor; and, responding to debriefing questions about the tasks. Analyses of the subjects' letters, revisions of those letters, responses to the passage questions, debriefing comments, and an examination of the contributions that reading, writing, knowledge activation, or questions had upon thinking and task engagement revealed three major findings.

First, reading, writing, knowledge activation, and questions prompted different reasoning operations as measured by student's responses to a series of debriefing questions. Similar to the findings of Newell (1984), and Copeland (1987), the authors contend that students who wrote in the context of reading were more engaged in the task (pursuing ideas, answers to questions, and judging their own ideas and the authors); students who did not write at least once before composing a final draft (especially the knowledge activation group) appeared to read for purposes of remembering ideas.

Second, the effects of these reading operations shift depending on whether reading and writing occur separately or in combination with each other. This was especially apparent at the point of revision. Students who wrote and read were involved in pursuing a greater variety of changes to their original written text than those who wrote and did not read. For example, while students who wrote and read made frequent additions and deletions in the process of reshaping their text, students who wrote and did not read were most concerned with paraphrasing and correcting spelling and punctuation.

Third, if cognitive engagement in a task is reflected in a greater willingness to revise one's position on an issue, then the data suggest that reading and writing in combination are more likely to induce one to think more carefully and deliberately than when reading or writing occurs separately.

In review, each of these studies presents evidence to suggest that more extended forms of writing performed in the context of reading result in substantially better learning than other less cognitively engaging writing-related activities (i.e., notetaking, outlining, study-questions, etc.). While each of the experiments pursue somewhat different arguments as to why writing has such an effect on learning, as a whole these studies suggest that it is the act of composing, by virtue of its potential to induce one to think more carefully and deliberately about what was read or is about to be read, that makes the combination of writing with reading a uniquely powerful learning duo.

Despite these findings concerning the positive influence of writing on learning, it is important that we attempt to explain in more specific detail exactly how various forms of writing affect one's thinking and subsequent learning. To this end, Langer and Applebee (1986) conducted a three-year study which investigated writing and the teaching of writing in high school science and social science classrooms. The study consisted of two basic lines of inquiry. On one level they sought to provide support for the contribution that writing can make to content area learning by examining the specific thinking processes and learning that results from various writing tasks. On a second level, the authors worked collaboratively with content area teachers in various classroom settings in hopes of redirecting teachers' assignments of student writing toward tasks that required more application, analysis, and interpretation of new learning. Findings from this first line of inquiry are of particular interest to us here.

In this aspect of the study, Langer and Applebee explored the nature of the thinking and learning that result from various types of writing activities. In particular, they wished to study how students' engagement in the several different writing/study activities affected their ability to learn from certain content area reading material. In order to examine students' thinking and learning during the tasks, students were taught to verbalize all thoughts that came to mind when completing the various assignments (Flower & Hayes, 1980; Langer 1986a, 1986b).

Across three separate experiments, over 400 students from 9th to 11th grade participated in a wide range of reading and/or writing tasks. Across the studies, these tasks required students to perform one of the following activities: read and study without writing, take notes after reading, answer study-guide or comprehension questions, engage in supplementary reading, write a summary, or write an analytical essay. Also, over the course of the three studies, several instruments were designed to examine how students' thinking, as well as what they had learned, varied as a result of their engagement in the different activities.

Langer's (1980) measure of topic-specific knowledge was used to assess how students' knowledge of the topic changed due to their engagement in the specific activities. In addition, students' verbal reports provided insights into their changing thought processes. Finally, both multiple-choice and free-recall tests were employed to measure passage comprehension.

Across each of the studies, writing emerged as a powerful means to foster students' subject matter learning. The authors report that each of the writing activities they examined resulted in learning not achieved when reading was performed in a context without some form of writing. In addition, Langer and Applebee (1986) found the following to be true with regard to the different kinds of writing tasks. As they summarize:

> Beyond that we learned that writing is not writing, is not writing; different kinds of writing activities lead students to focus on different kinds of information, to think about that information in different ways, and in turn to take quantitatively and qualitatively different kinds of knowledge away from their writing experiences. (Langer & Applebee, 1986, p. 174)

Results from students' think-aloud protocols and recall tasks indicated that summary writing and notetaking encouraged students to direct their attention to the whole text in more comprehensive yet more superficial ways. This is in sharp contrast to analytical writing which lead students to think more deeply and deliberately about fewer select ideas and information in the text. Finally, study questions lead to the least amount of in-depth processing of the information. However, as the authors explain, since such questions are often designed to cover many different aspects of material being studied, they "generally lead to short-term recall of a good deal of loosely organized information" (Langer & Applebee, 1986, p. 175). On the other hand, examination of students' on-line reasoning operations during the writing tasks indicated that analytical writing, because it involves "more complex manipulations" of the material about which students' are writing, leads to more in-depth understandings for longer periods of time (p. 175).

However, one characteristic of the research most frequently employed in the study of students' writing and learning, has been the tendency to maintain considerable control over the specific approach students use in studying or learning. More precisely, these investigations tend to prescribe the sequence or *process* by which students are to read, write an essay, take notes, answer questions, reread, or write a summary enroute to acquiring knowledge. In addition, these studies also prescribe the *kind* of reading or writing students are expected to undertake. With the exception of the work by Tierney, Soter, O'Flahavan, & McGinley (1986), these experiments do not permit students to engage in combinations of these activities as part of learning. Unfortunately, the decision by researchers to determine the manner in which students read and/or write in order to acquire new knowledge has limited what we know about reading, writing, and their relationship to thinking and learning.

First, since a majority of experiments have involved a restricted array of researcher-directed learning engagements, little is known about students' *decisions* to engage in different forms of reading and writing in the course of learning as well as the *functions* or purposes that these different forms might serve in completing a task.

Second, since the type of writing that students are permitted to do in experimenter-directed engagements is often held constant within groups, our knowledge regarding the nature of the problem that students are asked to solve and how it affects the reading and writing in which they engage has remained superficial.

Third, by overemphasizing experimenter-directed engagements in studies of reading, writing and learning, we continue to foster instructional environments in which students see writing and reading activities as serving the purposes of some other person with the authority to assign them (Tierney & O'Flahavan, in press). As such, students are not allowed to see these language activities as a rhetorical acts which can be used for their own purposes in subject matter learning.

Fourth, experimenter-sponsored engagements rarely permit students to engage in complex *combinations* of various types of reading and/or writing (notetaking, outlining, mapping, summarizing, writing a draft, reading a draft, reading different texts, rereading texts, or reading notes) enroute to learning about a topic. As a result, research has been slow to accept a view of literacy learning in which student-directed combinations of reading and writing afford a learner several unique yet partially overlapping perspectives on a given topic of study.

For example, in a study mentioned earlier, Langer and Applebee (1986) provide evidence of the different types of thinking and learning that result from notetaking, reading, analytical writing, summary writing, and study-guide questions. In light of these findings, consider for a moment the multifaceted perspective on a topic that student-directed combinations of several of these activities would provide in studying a particular content domain; different forms of reading and writing engaging one in different types of thinking and learning. It is our view that literacy in this context should be understood in terms of the variety of reading and writing forms or "tools" one can use for their own purposes in solving problems. These intellectual tools in turn comprise an individual's literacy repertoire.

In attempting to establish support for this approach to literacy, our reasoning will proceed along the following lines: First, we will present evidence in support of a view of literacy and literacy learning in which reading and writing are understood as different "lenses" through which one can more thoroughly examine or explore a topic. The notion of "criss-crossing" is suggested to explain how these different "lenses" may expand and extend the thinking and learning of students. Second, we argue that the kinds of thinking and learning that result from using various forms of reading and writing can be better understood by research that seeks to examine students' self-directed *combinations* of these activities as they use them in the process of learning. Third, we propose that such a line of research would help establish a view of critical literacy which understands students' ability to learn from text in terms of their repertoire of literacy skills.

This theoretical orientation receives support from research along two separate fronts: (a) current theories of knowledge acquisition in complex and ill-structured content domains, and (b) some of the more recent functional approaches to literacy. We turn first to a discussion of current theories of knowledge acquisition and their application to this notion of literacy.

Traversing a Topical Landscape: Theories of Knowledge Acquisition

The view that reading and writing represent different ways of thinking and knowing parallels current views of knowledge acquisition in complex and "ill-structured" content domains (Spiro, Vispoel, Schmitz, Samarapungavan, & Boerger 1987). According to Spiro et al., (1987) the term "ill-structured" describes those knowledge domains that, "because of a combination of breadth, complexity, and irregularity, formulating knowledge in that domain to explicitly prescribe its full range of uses is impossible" (p. 177).

Because of the ill-structured nature of many content domains (e.g., medicine, business, literature, history), Spiro et al. (1987), propose an approach to knowledge acquisition that is highly case-based. The instructional system underlying this theory emphasizes training which induces students to make "connections between several apparently dissimilar cases" that are related to a particular topic of study (p. 187). These authors argue that while there may be some similarity across cases, each case is capable of contributing something different to our knowledge of a given content. In this sense, they describe an approach to knowledge acquisition that treats a content domain as a "landscape that is explored by criss-crossing it in many directions and from several perspectives" (Spiro et al., 1987, p. 178). In extending this metaphor, Spiro et al. (1987), explain that various cases provide the means for "traversing" a "topical landscape," each affording its own unique view or perspective on the topic of interest (p. 187).

In light of this work in knowledge acquisition, we propose a view of literacy in which various forms of reading and writing are understood as different ways of knowing or traversing a "topical landscape." As Langer and Applebee (1986) have demonstrated, students' engagements in different forms of reading and writing resulted in qualitatively different types of thinking and learning with regard to the content they were studying. We wish to extend these findings in arguing that students' combinations of different forms of reading and writing result in a more multifaceted understanding of a topic by virtue of the different perspectives that they provide. It follows that such a theory would also

recommend a line of research designed to study students' self-directed engagements in *combinations* of these activities as ways of traversing, examining, and thinking about a subject. The subsequent discussion will present additional reasons for examining students' self-directed engagements in reading and writing.

Functional Approaches to Literacy

Some of the more recent functional approaches to literacy have taken the position that reading and writing represent the means by which one can achieve specific goals both in school and in their daily lives. In contrast to more formal approaches which view literacy as the "mastery of forms" for thinking and expressing thought, more recent functional approaches understand literacy to be "the ability to use appropriate discourse forms to accomplish desired ends" (Walters, Daniell, & Trachsel 1987, p. 860). In a related vein, Katz (1982) has argued that schools should attempt to develop students' "critical literacy," or more specifically, their ability to use reading and writing in ways that exceed those uses often associated with minimum competency (p. 192).

Several other theorists have adopted this "critical" perspective on literacy. For example, as Mackie (1981) points out "to be literate is not to have arrived at some predetermined destination, but to utilize reading, writing, and speaking skills so that our world is progressively enlarged" (p. 1). Likewise, Freire (1982) contends "literacy consists in acts of cognition" as opposed to the transmission of prepackaged information (p. 67). In this sense, reading and writing may be thought of as those "cognitive acts" which provide individuals with the means to engage in the kinds of thinking and learning required by their particular social and intellectual community. The comment offered by a recent panel of United States educators about the use of reading and writing by a biologist reflects these same notions. As the panel concurred:

> A learner is only a partial biologist, for instance, if he cannot read or write to discover information and meaning in biology. When a student takes the results of his or her observations about lobsters, reads, writes a draft, talks, reads, then writes again, he or she learns what it is to think critically. (Guthrie, 1986, p. 15)

Freeman and Sanders (1987) assume a similar functional stance in discussing the difficulties encountered in school settings by students who use writing and reading for markedly different purposes at home (Heath 1982, 1983). Drawing on the work of Szwed (1981), they explain that such difficulties are not so much a question of whether or not children have been read to, but to "the gap between the expectations and the practices of the home and school" (p. 642).

In consideration of these difficulties, several researchers have developed programs aimed at helping students draw connections between the more personal and familiar ways reading and writing are used at home to the ways they are used in school settings. For example, in her work with students in rural communities, Heath (1983) has developed methods of teaching writing in the classroom in ways which more closely reflect the purposes for which writing is used in home communities.

Still others regard such programs as an attempt to encourage children to see that writing done in school is in fact related to the "real writing" they do as part of their daily lives. Freeman and Sanders (1987) capture the essence of this point in exploring the social meaning of literacy:

> If students could feel that their writing serves a function relevant to their own lives and interests, perhaps they would be willing to work on their writing tasks until the writing is truly completed and not merely handed over to the authorities. In the process students will come to view writing as a natural, integrated and necessary part of classroom life, much like oral communication, and not something reserved for "language" or "English." (p. 644)

The authors also argue that by emphasizing the purpose that writing serves in students' lives and communities, teachers "alert students to writing that is self initiated, in contrast to writing that is engaged in because another person with authority over the writer has assigned or delegated the writing task" (p. 644).

Conclusions

In this paper we have proposed that literacy should be understood as the ability to enlist a repetoire of discourse forms to explore and extend thinking and learning. In support of this view, we have drawn upon the theoretical and research findings from several sources including research in reading and writing, recent work in knowledge acquisition, and current thinking underlying functional approaches to literacy. In light of this work, we proposed several new directions for both research and practice. In terms of research, we have argued for the development of a line of inquiry which would explore students' self-directed enlistments of reading and writing as ways of acquiring knowledge. It is our contention that only by examining students' self-directed engagements can we begin to study and understand students' strategic decisions to engage in different forms of reading and writing in the service of learning. While previous studies have examined the influence of a restricted array of teacher-initiated reading and writing tasks on content learning, we see the need for research which investigates in-process thinking and learning by individuals involved in the self-directed use of a repertoire of reading and writing activities. In terms of instruction, we contend that the development of literacy repertoires should be considered a major goal as students study difficult topics and attempt to solve complex problems. Indeed, fostering students' sophisticated use of a literacy repertoire may warrant a reconceptualization of literacy learning which would entail a critical analysis of current principles and practices dominating how reading and writing are used and taught across the grades.

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